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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,120	04/18/2006	Akio Misaka	071971-0569	7423

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MCDERMOTT WILL & EMERY LLP
600 13TH STREET, NW
WASHINGTON, DC 20005-3096

EXAMINER	
ALAM, RASHID A	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
01/21/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/576,120	MISAKA, AKIO	
	Examiner	Art Unit	
	RASHID ALAM	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 November 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,10-19,30 and 31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,10-19,30 and 31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/10/2009 has been entered.

2. The applicant's request for reconsideration filed on 11/10/2009 was received. Claims 1 and 5 were amended.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 1-4, 11-14, 16-19, 30, and 31, rejected under 35 U.S.C. 103(a) as being unpatentable over Misaka (WO 02/091079 with English translation US 2004/0029023) in view of Misaka (US 2004/0121244), and Heissmeier (US 2002/0155362).

Regarding claims 1-3, 30, and 31, Misaka '023 teaches a photomask with a transparent substrate in which mask enhancers are placed in regions and phase shifters are placed in regions surrounded by light shielding portions having transparent portions in between regions, the first region being the bottom part of figure 52:b, the second region being the part of figure 52:b that is right to the bottom part, and the third region being the top part of figure 52:b, and the transparent region is sandwiched between the second and third regions (see abstract and figures 15B, 44B, 5, 15, and 43 of English translation). Misaka '023 also teaches a varying width of the phase shifters so that the second pattern region has a smaller phase shifter width than the first pattern region and the width of the transparent portion is larger than the a given dimension as well (see figures 28 and 29 as well as paragraphs 0302, 0113 and 0114 of English translation). Misaka '023 teaches the use of mask patterns with varying widths (see figure 30 and paragraph 0300). However, Misaka '023 is silent about the transparent portion surrounding the mask pattern and the positioning of the third pattern.

Misaka '244 teaches a first pattern, second pattern, third pattern, and fourth pattern as described in the instant application wherein the second, third, and fourth pattern are adjacent and vertical to each other and the first pattern is vertical to the second, third and fourth pattern, but only adjacent to the second pattern (see figure 19d). Further, Misaka '244 teaches the varying widths of patterns are used (see figure 16b). Lastly, Misaka '244 teaches a transparent portion surrounds a mask pattern (see figure 16a).

Heissmeier teaches a transparent portion in a mask pattern that surrounds a mask pattern (see figure 2b). Therefore, it would have been obvious to one skilled in the art at the time of the invention to have a mask pattern that contains phase shifters and light shielding patterns configured in a first, second, third, and fourth pattern surrounded by a transparent portion by Misaka '023, because Misaka '244 teaches a first pattern, second pattern, third pattern, and fourth pattern as described in the instant application wherein the second, third, and fourth pattern are adjacent and vertical to each other and the first pattern is vertical to the second, third and fourth pattern, but only adjacent to the second pattern in order to provide a photomask which makes it possible to form a small pattern under the same exposure conditions without depending on the shape and the density of the pattern, a method for forming the photomask, and a method for forming a pattern by using the photomask and Heissmeier teaches a transparent portion in a mask pattern that surrounds a mask pattern in order to provide an improved method for determining possible phase conflicts on alternating phase masks, which overcomes the above-mentioned disadvantages of the heretofore-known devices and methods of this general type and which allows for the automatic removal of these phase conflicts.

Regarding claim 4, Misaka '023 teaches a semi-light-shielding-portion is used as a light-shielding portion constituting a mask pattern (see paragraph 0013 and figure 28 of English translation).

Regarding claims 11-14, Misaka '023 teaches a reduced size projection exposure apparatus is used to have the widths of the first and second structures

to be between 0.8 x M x lambda/NA to 0.8 x M x lambda/NA, and the width of the first structure to the second structure is smaller (see paragraphs 0008 to 0019 and 0113).

Regarding claim 16-18, Misaka '023 teaches The mask pattern includes a phase shifter that generates a phase difference of 180 degrees and (150+360 x n) degrees or more and (210+360 x n) degrees or less, where n=an integer, with respect to the exposure light between the phase shifter and a light-transmitting portion in which the mask pattern is not formed on the transparent substrate (see paragraph 0034).

Regarding claim 19, Misaka '023 teaches a photomask with a transparent substrate in which mask enhancers are placed in regions and phase shifters are placed in regions surrounded by light shielding portions having transparent portions in between regions, the first region being the bottom part of figure 52:b, the second region being the part of figure 52:b that is right to the bottom part, and the third region being the top part of figure 52:b, and the transparent region is sandwiched between the second and third regions (see abstract and figures 5, 15, and 43 of English translation). Misaka '023 teaches etching, or trenching, the transparent substrate (see paragraph 0038). Misaka '023 also teaches a varying width of the phase shifters so that the second pattern region has a smaller phase shifter width than the first pattern region and the width of the transparent portion is larger than the a given dimension as well (see figures 28 and 29 as well as paragraphs 0302, 0113 and 0114 of English translation). Furthermore, Misaka '023 teaches a mask data generation method in which a simulation is performed

to carry out the steps of forming phase shifters on a mask (see paragraphs 0352 to 0369).

5. Claims 5-7, 10, and 15, are rejected under 35 U.S.C. 103(a) as being unpatentable over Misaka (WO 02/091079 with English translation US 2004/0029023), Misaka (US 2004/0121244), and Heissmeier (US 2002/0155362), as applied to claims 1-4, 11-14, 16-19, 30 and 31, in view of Ohsaki (US 6,586,168).

Regarding claims 5 and 10, Misaka '023, Misaka '244, and Heissmeier teach as stated above. However, Misaka '023, Misaka '244, and Heissmeier are silent about a fourth and fifth pattern connected to the mask pattern in a continuous pattern.

Ohsaki teaches a mask pattern used for transferring a very fine circuit pattern onto a photosensitive substrate, with a fourth and fifth pattern in a continuous pattern structure (see figures 15B and 15C). Therefore, it would have been obvious to one skilled in the art at the time of the invention to have a mask pattern with five mask pattern structures connected in a continuous mask pattern by Misaka '023, Misaka '244, and Heissmeier, because Ohsaka teaches a mask pattern used for transferring a very fine circuit pattern onto a photosensitive substrate, with a fourth and fifth pattern in a continuous pattern structure in order to provide an exposure method, an exposure apparatus and/or a device manufacturing method, by which, when a multiple exposure process is to be

performed by using plural mask patterns being different in image contrast, every fine line can be reproduced successfully.

Regarding claims 6, 7, and 15, Misaka '023 teaches a photomask with a transparent substrate in which mask enhancers are placed in regions and phase shifters are placed in regions surrounded by light shielding portions having transparent portions in between regions, the first region being the bottom part of figure 52:b, the second region being the part of figure 52:b that is right to the bottom part, and the third region being the top part of figure 52:b, and the transparent region is sandwiched between the second and third regions (see abstract and figures 5, 15, and 43 of English translation). Misaka '023 also teaches a varying width of the phase shifters so that the second pattern region has a smaller phase shifter width than the first pattern region and the width of the transparent portion is larger than the a given dimension as well (see figures 28 and 29 as well as paragraphs 0302, 0113 and 0114 of English translation).

Response to Arguments

Applicant's arguments filed 11/10/2009 have been fully considered but they are not persuasive. The applicant argues that the references of Misaka '023 and Ohsaki presented in the office action dated 08/21/2009 do not teach the claimed invention. Specifically, the applicant argues the reference of Misaka '023 does not teach the phase shifters being surrounded by light shielding patterns and the varying sizes of the widths of the phase shifters, the third pattern located adjacent to the first pattern and vertical to the first pattern, and

that the transparent portion surrounding the mask pattern, as well as the patterns varying in width.

The references of Misaka '244 and Heissmeier were added to teach the amended claim limitations as set forth in the reply dated 11/10/2009. The examiner respectfully contends that the references of Misaka '023, Ohsaki, Misaka '244, and Heissmeier do teach the limitations of the claims in the instant application and the scope of the invention. Misaka '244 teaches a first pattern, second pattern, third pattern, and fourth pattern as described in the instant application wherein the second, third, and fourth pattern are adjacent and vertical to each other and the first pattern is vertical to the second, third and fourth pattern, but only adjacent to the second pattern (see figure 19d). Further, Misaka '244 teaches the varying widths of patterns are used (see figure 16b). Lastly, Misaka '244 teaches a transparent portion surrounds a mask pattern (see figure 16a). Heissmeier teaches a transparent portion in a mask pattern that surrounds a mask pattern (see figure 2b).Misaka '023 teaches phase shifters that are surrounded by light shielding portions (see figures 15B and 44B). Thus the rejection stands.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RASHID ALAM whose telephone number is (571)270-3959. The examiner can normally be reached on Mon.-Fri. 7:30 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/
Supervisory Patent Examiner, Art Unit 1795

/RASHID ALAM/
Examiner, Art Unit 1795